

# **EBOLA-MARBURG VIRAL DISEASES**

## **DISEASE REPORTING**

### ***In Washington***

Described in Africa, these diseases have never occurred in Washington State. One or more cases may indicate an act of terrorism and constitute a public health emergency.

### ***Purpose of reporting and surveillance***

- To identify rare diseases associated with travel.
- To identify potentially exposed health care workers or laboratory personnel and to provide counseling.
- To raise the index of suspicion of a possible bioterrorism event if no natural exposure source is identified.

### ***Reporting requirements***

- Health care providers: **immediately notifiable to Local Health Jurisdiction**
- Hospitals: **immediately notifiable to Local Health Jurisdiction**
- Laboratories: **immediately notifiable to Local Health Jurisdiction**, specimen submission required
- Local health jurisdictions: **suspected or confirmed cases are immediately notifiable to DOH Communicable Disease Epidemiology: 1-877-539-4344**

## **CASE DEFINITION FOR SURVEILLANCE**

### ***Clinical criteria for diagnosis***

A severe illness with temperature  $\geq 101^{\circ}\text{F}$  ( $38.3^{\circ}\text{C}$ ) of  $<3$  weeks duration, no predisposing factors for hemorrhage, no established alternative diagnosis with at least two of the following:

- Petechial or hemorrhagic rash
- Epistaxis
- Hematemesis
- Hemoptysis
- Hematochezia
- Bleeding from other sites

**Laboratory criteria for diagnosis (to be completed by Level D laboratories only)**

- Identification of Ebola or Marburg virus from a clinical specimen.

**Case definition**

- Probable: A case that meets the clinical case definition, is not laboratory confirmed, and is not epidemiologically linked to a confirmed case, but has appropriate exposure history.
- Confirmed: A case that is laboratory confirmed, or a case that meets the clinical case definition and is not laboratory confirmed, but is epidemiologically linked to a confirmed case.

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**A. DESCRIPTION****1. Identification**

Severe acute viral illnesses, usually with sudden onset of fever, malaise, myalgia and headache, followed by pharyngitis, vomiting, diarrhea and maculopapular rash. The accompanying hemorrhagic diathesis is often accompanied by hepatic damage, renal failure, CNS involvement and terminal shock with multiorgan dysfunction. Laboratory findings usually show lymphopenia, severe thrombocytopenia and transaminase elevation (AST greater than ALT), sometimes with hyperamylasemia. Approximately 25% of reported primary cases of Marburg virus infection have been fatal; case-fatality rates of Ebola infections in Africa have ranged from 50% to nearly 90%.

Diagnosis is made by ELISA for specific immunoglobulin G (IgG) antibody (presence of immunoglobulin M (IgM) antibody suggests recent infection); by ELISA antigen detection in blood, serum or organ homogenates; by PCR; by detection of the virus antigen in liver cells by use of monoclonal antibody in an IFA test; or by virus isolation in cell culture or guinea pigs. Virus may sometimes be visualized in liver sections by EM. Postmortem diagnosis through immunohistochemical examination of formalin-fixed skin biopsy specimens is also possible. IFA tests for antibodies have often been misleading, particularly in serosurveys for past infection. Laboratory studies represent an extreme biohazard and should be carried out only where protection against infection of the staff and community is available (BSL-4 containment).

**2. Infectious Agent**

Virions are 80 nm in diameter and 790 nm (Marburg) or 970 nm (Ebola) in length, and are members of the Filoviridae. Longer, bizarre virion related structures may be branched or coiled and reach 10 µm in length. The Marburg virus is antigenically distinct from Ebola. Ebola strains from the Democratic Republic of the Congo (formerly Zaire), Ivory Coast, Gabon and Sudan have been associated with human disease. A fourth Ebola strain,

Reston, causes fatal hemorrhagic disease in nonhuman primates; few human infections have been documented and those were clinically asymptomatic.

### **3. Worldwide Occurrence**

Marburg disease has been recognized on six occasions: in 1967, in Germany and Yugoslavia, 31 humans (7 fatalities) were infected following exposure to African green monkeys (*Cercopithecus aethiops*) from Uganda; in 1975, the fatal index case of 3 cases diagnosed in South Africa had originated in Zimbabwe; in 1980, there were 2 confirmed cases in Kenya, 1 fatal; in 1982, 1 case occurred in Zimbabwe; and in 1987, a fatal case occurred in Kenya. In 1999, in the Democratic Republic of the Congo, at least 3 fatal cases of Marburg were confirmed among over 70 suspected cases of viral hemorrhagic fever.

Ebola disease was first recognized in 1976 in the western equatorial province of the Sudan and 500 miles away in Zaire; more than 600 cases were identified in rural hospitals and villages; the case-fatality rate for these nearly simultaneous outbreaks was about 70%. A second outbreak occurred in the same area in Sudan in 1979. A distinct strain was recovered from one person and from chimpanzees in the Ivory Coast in 1994. A major Ebola outbreak in 1995 was centered around Kitwit, Zaire. In 1996-1997 two outbreaks that were recognized in Gabon resulted in 98 recognized cases and 66 deaths. FA antibodies have been found in residents of several other areas of sub-Saharan Africa, but their relation to the highly virulent Ebola virus is unknown.

Ebola related filoviruses have been isolated from cynomolgus monkeys (*Macaca fascicularis*) imported in 1989, 1990 and 1996 to the US and in 1992 to Italy from the Philippines; many of these monkeys died. Four of five animal handlers with daily exposure to these monkeys in 1989 developed specific antibodies with no antecedent fevers or other illness.

### **4. Reservoir**

Unknown despite extensive studies.

### **5. Mode of Transmission**

Person to person transmission occurs by direct contact with infected blood, secretions, organs or semen. Risk is highest during the late stages of illness when the patient is vomiting, having diarrhea, or hemorrhaging. Risk during the incubation period is low. Under natural conditions, airborne transmission among humans has not been documented. Nosocomial infections have been frequent; virtually all Ebola (Zaire) patients who acquired infection from contaminated syringes and needles died. Transmission through semen has occurred 7 weeks after clinical recovery.

**6. Incubation period**

Three to 9 days with Marburg and 2-21 days in Ebola virus disease.

**7. Period of communicability**

As long as blood and secretions contain virus. Up to 30% of primary caregivers in Sudan were infected, while most other household contacts remained uninfected. Ebola virus was isolated from the seminal fluid on the 61st, but not on the 76th, day after onset of illness in a laboratory acquired case.

**8. Susceptibility and resistance**

All ages are susceptible.

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**B. METHODS OF CONTROL****1. Control of patient, contacts and the immediate environment:**

- a. Report to local health authority.
- b. Isolation: Institute immediate strict barrier isolation in a private hospital room away from traffic patterns. Entry of nonessential staff and visitors should be restricted. Because of the low incidence of nosocomial infections reported from African hospitals, transfer to special isolation units is not considered necessary; however, nosocomial transmission has occurred, and strict procedures for isolation of body fluids and excreta should be maintained. A negative pressure room and respiratory protection is desirable. Male patients should refrain from sexual activity until the semen has been shown to be free of virus or for 3 months. To reduce exposure to infectious materials, laboratory tests should be kept to the minimum necessary for proper diagnosis and patient care. Technicians should be alerted to the nature of the specimens and supervised to ensure that appropriate specimen inactivation/isolation procedures are followed. Dead bodies should not be embalmed but rather sealed in leak proof material and cremated or buried promptly in a sealed casket.
- c. Concurrent disinfection: Patient's excreta, sputum, blood and all objects with which the patient has had contact, including laboratory equipment used to carry out tests on blood, should be disinfected with 0.5% sodium hypochlorite solution or 0.5% phenol with detergent, and, as far as possible, appropriate heating methods, such as autoclaving, incineration or boiling. Laboratory tests should be carried out in special high containment facilities; if there is no such facility, tests should be kept to a minimum and specimens handled by experienced technicians using all available precautions such as gloves and biological safety cabinets. When appropriate, serum may be heat inactivated at 60°C (140°F) for 1 hour. Thorough terminal disinfection with 0.5% sodium hypochlorite solution or a phenolic compound is adequate; formaldehyde fumigation can be considered.
- d. Quarantine: Only surveillance is recommended for close contacts (see B2f, below).

- e. Immunization of contacts: None.
- f. Investigation of contacts and source of infection: Identify all close contacts (people living with, caring for, testing laboratory specimens from or having noncasual contact with the patient) in the 3 weeks after the onset of illness. Establish close surveillance of contacts as follows: body temperature checks at least 2 times daily for at least 3 weeks after last exposure. In case of temperature greater than 38.3°C (101°F), hospitalize immediately in strict isolation facilities. Determine patient's place of residence during 3 weeks prior to onset, and search for unreported or undiagnosed cases.
- g. Specific treatment: Ribavirin (Virazole), most effective within the first 6 days of illness, should be given IV, 30 mg/kg initially, followed by 15 mg/kg every 6 hours for 4 days and 8 mg/kg every 8 hours for 6 additional days. See also: Borio L, Inglesby TV, Peters, CJ, et al. Hemorrhagic fever viruses as biological weapons: medical and public health management. JAMA 2002; 287:2391-2405 (in *Additional Resources*).

### **3. Epidemic measures**

Not determined.

### **4. International measures**

Notification of source country and to receiving countries of possible exposures by infected travelers.